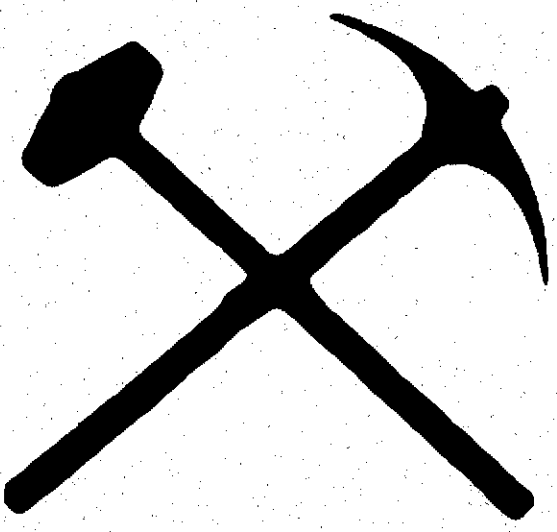
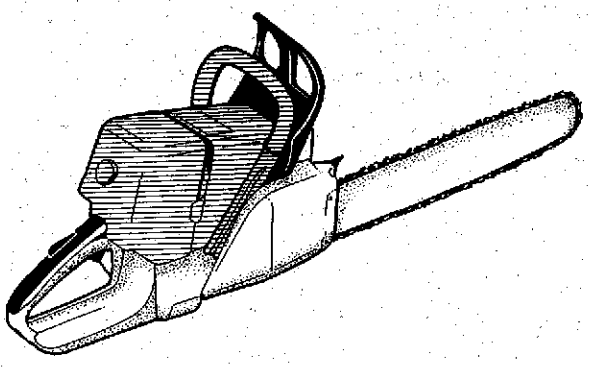
CHAPTER 10

SELECTING THE RIGHT TOOL



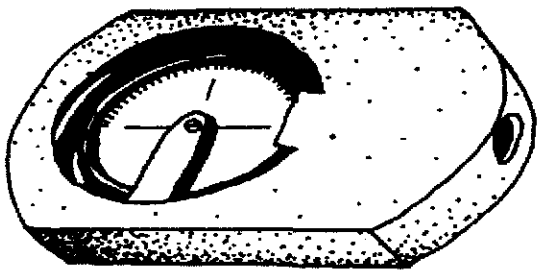


A wide variety of tools are available for trail use. Local and individual preferences often dictate the kinds of tools which are chosen for various tasks. Some of the most commonly used tools and their functional purposes are identified in this chapter. A few tips on using the tool safely and effectively are also included. Every trail maintainer needs to learn how to choose the correct tool for the job, use it effectively and safely, and care for and store it properly. Purchasing high quality tools initially is more cost effective—long-term performance exceeds those of lower quality.

The right tool should be used for the job. Substitutes are dangerous and ineffective. Tools should be kept in good condition—throwing them on the ground can damage them. A file should be carried for spot-sharpening edges throughout the work day. Tools should be carried with the appropriate guards in place. At the end of the work day, all tools should be cleaned, sharpened, lightly oiled, and stored properly.

HAND TOOLS

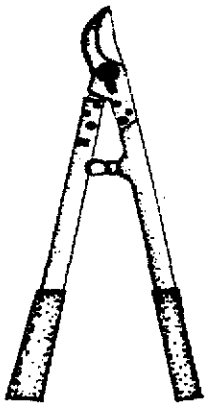
Clinometer



Uses: A clinometer is an essential tool when locating and laying out a trail. This compass-sized tool allows the user to measure the slope (grade) of a hill or trail.

Tips: Both eyes must be kept open when sighting through the clinometer (see Eye-Level Survey Techniques in Appendix 3).

Lopper



Uses: Cutting selected limbs or saplings during construction and maintenance phases. Larger models can cut limbs approaching 2" in size.

Tips: High quality loppers with replaceable parts should be used. Saplings should be clipped flush to the ground and limbs flush to the tree. Loppers must not be thrown on the ground as this may clog the head and dull the blades. At the end of the day, the blade should be cleaned and wiped with light oil.

Safety: Leather gloves and a hardhat should be worn. Eye protection is also recommended.

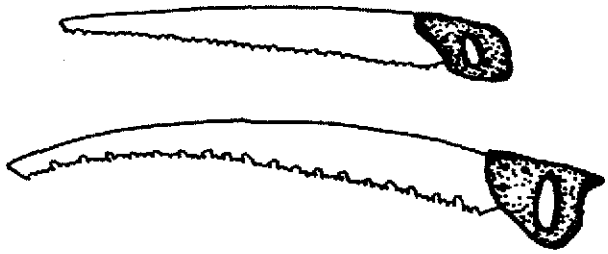
Hand Pruner

Uses: Cutting small branches encroaching on the trail. Also useful for cutting protruding roots that are tripping hazards. Mostly used for trail maintenance.

Tips: Handier and lighter to carry than a lopper when only minor pruning is needed—it should be carried in hand while hiking to clip small branches as encountered.

Pruning Saw

Uses: Cutting limbs encroaching on the trail. Can also be used for cutting small trees or shrubs at the base and removing small to medium sized windfalls. Pruning saws come in a wide variety of sizes and tooth patterns. They range from small folding models with *6"* to *8"* blades to those with blades up to approximately *26"* in length. Blades are curved and cut only on the back-stroke—a handy feature when removing hard to reach limbs.

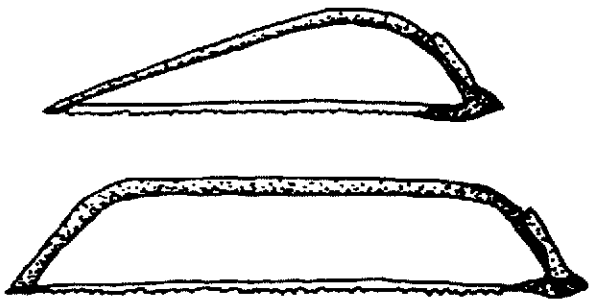


Tips: Pruning saws should be resharpened often. A light coat of oil should be applied to the blade after each use.

Safety: Except for folding models, pruning saws should be kept in a sheath when not in use. A hand holding a limb or sapling should not be crossed beneath the hand pulling the saw—this can lead to a nasty cut when the saw comes through the limb sooner than expected. Personal Protective Equipment (PPE) includes leather gloves and a hardhat.

Bow Saw

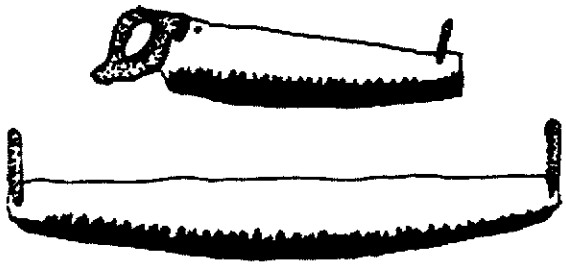
Uses: Cutting limbs, small trees, and small to medium sized windfalls —essentially the same as pruning saws except that bow saws can cut larger material. Bow saws have blades ranging from about *21"* to *36"* in length. The smaller saws are generally triangular in shape and work well for pruning. Their shape limits the length and depth of the stroke to material less than *4"* to *5"* in diameter. The larger saws are bow-shaped and can cut material up to *8"* in diameter, but are more prone to twisting and binding in the cut.



Tips: Bow saws cannot be resharpened due to the hardness of the blade. When the blade becomes dull, rusty, or bent, it should be replaced. It should be wiped with light oil before storing. Smaller saws are more useful—use another tool for cutting large material.

Safety: Same as pruning saws. PPE includes leather gloves and hardhat.

Crosscut Saw



Uses: Cutting large blowdowns and felling timber. Crosscut saws are available in two basic designs—one-person and two-person. The one-person models are generally 3 to 4 feet in length and are perhaps most useful for clearing blowdowns. Even though they are called one-person, an optional second handle can be added. Two-person crosscuts are 5 to 8 feet in length, with a handle at each end. Both types are useful for constructing trail structures in remote areas. In combination with an adze, two-person crosscut saws are especially good for creating a level walking surface on native log bridges. Crosscut saws (especially two-person models) require special skills and care, but are nevertheless an attractive, lightweight alternative in remote areas. In formally designated Wilderness areas, where power tools are not allowed, crosscut saws are perhaps the only alternative for cutting large material. In less remote areas, they are used only occasionally as the axe, bowsaw, and chainsaw perform the same jobs.

Tips: One of the biggest problems with crosscut saws is finding someone who is *competent in sharpening them*—if no one is available to correctly sharpen the saw, there is no use purchasing one. What was once fairly common knowledge has been largely forgotten, except by those individuals who still routinely work in remote areas. Skills in using and sharpening the saws can be learned through on-the-job experience with wilderness rangers, or by participating in a good workshop such as a Wilderness Skills Workshop conducted by the Student Conservation Association. Another source of training is the Crosscut Saw Manual by Warren Miller, U.S. Forest Service Equipment Development Center, Missoula, MT. This is available from the Government Printing Office in Washington, D.C.

A crosscut saw should never be placed in the dirt—the teeth should remain clean and sharp. Generally, the saw is leaned against a tree when not in use, but care must be taken to ensure it does not fall to the ground.

Safety: To protect both the user and the saw, a sheath should always be used. These can be manufactured using sections of old fire hose or assembled from plywood. Several good commercially manufactured sheaths are also available. As with any sharp tool, extreme caution should be used to avoid cuts. Required PPE includes a hardhat and leather gloves.

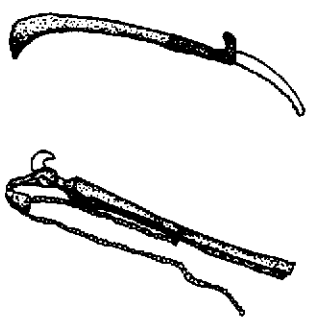
Pole Pruner and Pole Saw

Uses: Cutting overhanging limbs that cannot be reached with bowsaws, loppers, and other short-reaching tools. Pruners and saws are often combined on the same handle to allow for more flexibility.

Tips: When cutting larger limbs with the pole saw, it is best to use a two-step process. In the first step, a *4"* to *6"* stub is left by making an under-cut and then a cut from the top of

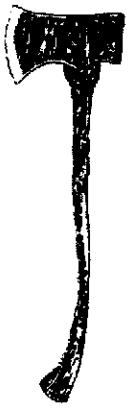
the limb. This prevents stripping the bark from the trunk of the tree. In the second step, the stub is removed flush with the trunk.

Safety: Fingers should be kept out of the pruning head. The rope may snag unexpectedly and cause the blade to close causing a serious cut. When using the saw, eye protection will prevent saw dust from getting into the user's eyes. Required PPE includes eye protection, hardhat, and leather gloves.



Pole saw (top) and Pole pruner (bottom)

Axe



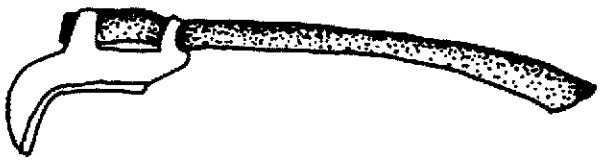
Uses: Clearing blowdowns, limbing trees, felling trees, and hewing flat surfaces. Axes demand a great deal of practice to use safely and effectively and are used less today than they were in earlier times. They have largely been replaced by various saws and other cutting tools, but nevertheless, the axe is versatile, simple to maintain, and in skilled hands can be as fast and effective as other tools. It will also not bind in a log like a saw blade. There are two basic kinds of axes—the single-bit and the double-bit. Double-bit axes are generally preferred as they have better balance and allow one blade to be kept razor sharp for cutting while the other blade can be used for chopping roots and cutting in dirty wood. Single-bit axes are sometimes considered to be safer than double-bit axes primarily because there is less chance to fall on an exposed blade.

Tips: Effective axe work requires a great deal of practice, but the skills required are not as demanding as those required for crosscut saws. Skills can be acquired through working with experienced individuals or by participating in a good workshop such as a Wilderness Skills Workshop conducted by the Student Conservation Association.

On downed logs, a notch that is twice as long as the diameter of the log should be made. The blows should progress through the log and alternate from one side of the notch to the other. When removing a limb from a downed tree, the direction of the blow should be made from the root-end of the tree rather than down into the crotch.

Safety: Before cutting, all limbs and brush that might interfere with swinging should be removed. Springy branches or broken limbs that might deflect the blade should be avoided. The user's feet should be positioned at shoulder width and firmly planted. When limbing or hewing a downed tree, the user should stand on the side opposite the one being cut to keep the tree between the blade and the user's shins. When not in use, or when carrying the axe, the blade should be covered with a sheath. PPE includes a hardhat, leather gloves, heavy leather boots, and eye protection. Inexperienced users should also consider wearing shin guards and toe guards or hard toe boots.

Brush Hook or Bush Hook

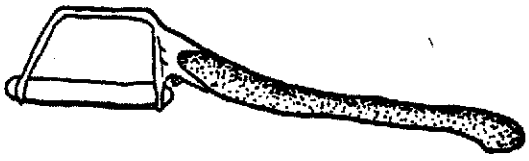


Uses: Cutting small saplings and brush too heavy for a weed whip. Swung like an axe, the brush hook's long handle and heavy head give it a powerful cut.

Tips: The blade should be kept sharp using a curved-edge whetstone.

Safety: Because twigs or limbs can catch the blade on the back swing or where space is limited, extra care should be taken to avoid accidents. A good grip on the handle is necessary, and it is important that the user keep clear of other workers. PPE includes a hardhat, leather gloves, and heavy leather boots.

Swede Axe

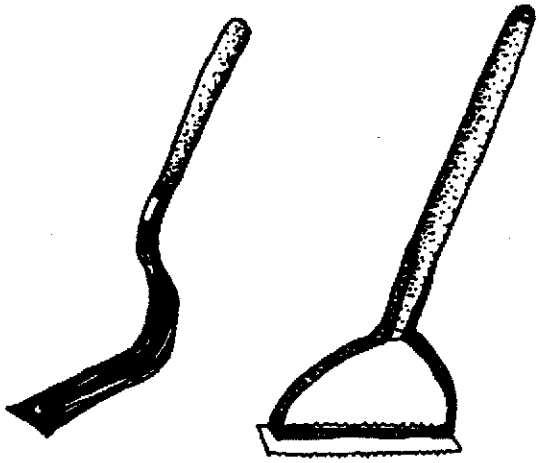


Uses: Cutting small saplings and brush that are too heavy for a weed whip and for cutting in cramped places. Its shorter handle and lighter weight make it faster, easier to control, and safer than an axe or brush hook. The thin, flat, replaceable blade cuts easily through springy stems and may be sharpened with a sharpening stone or file.

Tips: The blade should be replaced when it becomes badly nicked.

Safety: Same as the brush hook. PPE includes a hardhat, leather gloves, heavy leather boots. Inexperienced workers should also wear leg protection (chaps).

Weed Whip



L-shaped weed whip (left)
Triangular-frame weed whip (right)

Uses: The weed whip is swung back and forth like a golf club and cuts grass, weeds, light brush, briars, and small tree seedlings. It is a very effective tool for clearing new growth along the trail.

Tips: Weed whips come in two basic varieties—L-shaped and triangular-framed. The second variety is more stable, cuts larger material, and is recommended. It is fairly easy to break the wooden handle—for this reason, consider the Suwanee Sling.

Safety: Plenty of space should be left between the user and others. The handle should be held firmly in both hands and swung rhythmically back and forth. Strong

swings should be made to prevent the blade from bouncing or glancing off springy growth. The tool should be carried or stored with a sheath in place. PPE includes leather gloves and leather boots.

Suwanee Sling

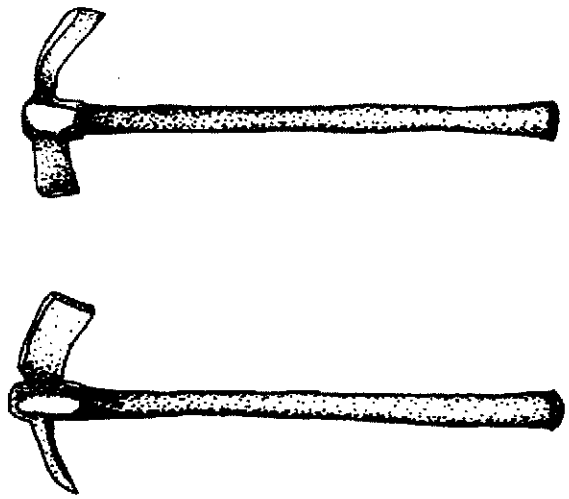
Uses: This is essentially a heavy duty weed whip that also has an axe blade. It does the same work as the weed whip, but can also cut through larger materials that may be occasionally encountered.

Tips: The tool's heavier weight allows it to more easily cut off larger material than a weed whip.

Safety: Same as a weed whip.

Pick Mattock and Cutter Mattock

Uses: A mattock is a heavy, strong, and popular tool that may be used for the roughest of work. Its primary use is for digging and moving dirt and rocks, cutting through roots, and unearthing boulders. It is especially useful when building new trail (especially sidehill trail), installing steps and waterbars, and other heavy work. The mattock's heavy weight allows it to move more material with less effort.



Cutter Mattock (top)
Pick Mattock (bottom)

There are two kinds of mattocks—pick mattocks and cutter mattocks. Both have an adze blade, but the pick mattock has a pick, opposing the adze, whereas the cutter mattock has a cutting blade. The pick mattock is most useful in hard or rocky soil where the pick is useful to break up the soil or pry out rocks. The cutter mattock is more useful in deeper, rooty soil where the cutter is needed to sever roots.

Tips: As with other swinging tools, the user should blend force with accuracy.

Safety: Choking up on the handle should be avoided—a glancing blow may strike the user. If breaking rock, goggles should be worn. PPE includes heavy leather boots and leather gloves.

Pulaski

Uses: The pulaski combines the blade of an axe with a narrow grubbing blade. It was developed for fighting forest fires, but is also helpful in trail work. It is not as balanced or

safe as the axe, nor as efficient as the mattock for moving soil, but it serves two purposes and saves weight if tools need to be carried long distances. If considerable amounts of axe work or mattock work are needed, the pulaski is a poor choice.

Tips: The axe end is sharpened and maintained like an axe, and the mattock end is sharpened like a true mattock. The pulaski's mattock blade can serve as a substitute adze if it is sharpened to a keen edge. If a pulaski is going to be used as an adze, it should not be used for any other purpose.

Safety: The pulaski can be dangerous due to its two sharp blades. It should always be stored and carried in a sheath. The same safety practices as used for an axe should be followed. PPE includes a hardhat, leather gloves, and heavy leather boots. Inexperienced users should have shin guards and possibly hard-toe boots.

McLeod

Uses: Constructing and maintaining trail. The McLeod is a heavy-duty combination hoe and rake. It has six digging (or rake) teeth opposite the hoe blade. It is useful for removing duff layers and loose ground debris or tamping loosened material to create a level trail. It can also be used to chop off light brush and roots. It must be supplemented with a mattock or other digging tool when there is considerable digging or heavy brush.

Tips: The hoe blade should be kept sharp.

Safety: Adequate space between workers should be determined before swinging this tool. Leather gloves are recommended.

Council Rake (Fire Rake)

Uses: Constructing and maintaining trail. The council rake looks like a section of sickle bar mower on the end of a straight handle. It is used for the same purposes as a McLeod.

Safety: A sheath should be in place during transport. Leather gloves are recommended.

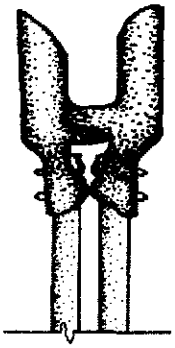
Shovel

Uses: Shovels are used for cleaning waterbars, culvert outlets, and diversion ditches, digging and moving soil and other granular material. They are also used for leveling a base for sill rocks, steps, etc. In trail work, long handled, round-pointed shovels are almost exclusively used. A variation is the fire-shovel which has the advantage of being lighter-weight and easier to carry.

Tips: The blade, including most of the blade's sides, should be kept sharp. A firefighter stance should be taken to more effectively and safely move material—the user should bend at the knees and rest the elbow of the hand holding the forward end of the handle on the inside of his/her knee. This is the power hand. The other hand holds the end of the handle and serves as the guide hand. The user should swing from side to side, keeping the elbow on the knee, cutting the soil with the side of the shovel that is opposite the power hand and moving it laterally with the continuation of the swing. For right handers, the power hand is the right hand and the right elbow rests on the right knee. Cutting is done with the left edge of the shovel and material is moved to the left. This technique does not work when digging a deep hole or ditch. The advantage is that the power comes mostly from the leg muscles—not the back muscles.

Safety: The most common injuries when using a shovel are back injuries. Bending from the knees instead of the waist will help prevent injury. Leather gloves are recommended.

Posthole Digger

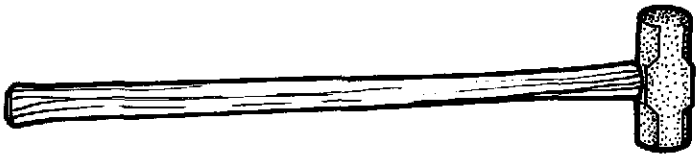


Uses: Digging holes for footings, posts, etc.

Tips: There are two basic types of post hole diggers—clam-type and auger-type. The clam-type is the most versatile of the two and can be used in a wide variety of soils. The auger-type works well only in sandier, dryer soils. It will not work in rocky soils and it is hard to clear of excavated material if the soil is wet.

Safety: Soil should be lifted from the hole with leg muscles—not back muscles. If the wooden handles are too flexible or the collar becomes bent, fingers can get pinched when the handles are closed. Leather gloves are recommended.

Sledgehammer



Uses: Breaking rocks, driving posts or stakes, nudging a heavy

timber into place, driving large spikes. Sledgehammers are primarily used during construction phases.

Safety: Before swinging, the user should make sure others are clear and obtain a firm stance with feet spread to shoulder width and firmly planted. PPE includes leather gloves. When striking rocks, goggles should be worn.

2½ or 3-Pound Hammer

Uses: Driving survey stakes, spikes, and other uses that are too demanding for a regular claw-hammer, but do not require the heavy duty blows of a sledge.

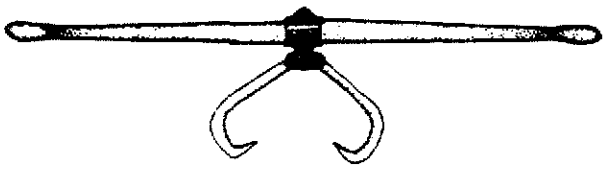
Crowbar (Rock Bar)

Uses: This is an essential tool for prying and levering large, heavy objects such as boulders, logs, and beams. Crowbars are heavy-duty steel and vary in length, weight and diameter. In general, crowbars have a chisel tip on one end and a rounded handle on the other. They are usually *1"* to *1½"* in diameter and vary between *40"* and *62"* in length.

Tips: For most purposes, a *54"* size seems to work best.

Safety: Since the crowbar often lifts and moves heavy loads, it can be dangerous. Fulcrums and footholds should be secure. The user should stay out from under the bar and the load being moved, and avoid levering with the bar between his/her legs. Undivided attention should be given during use to avoid mashed fingers and toes or other injuries. As with any lifting device, the user should lift with the legs—not the back. PPE includes leather gloves and heavy leather boots. For additional safety, hard-toe boots are advisable.

Log Carrier



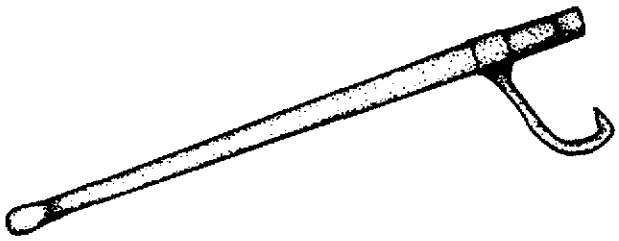
Uses: Carrying and moving heavy logs and timbers. The log carrier looks like a giant ice tong with long wooden handles. It is a two-person tool.

Tips: Many hands make light work. There is no rule that says how many log carriers and pairs of people should be assigned to a log. As many log carriers and people should be used as will comfortably fit along the length of the log to make the load manageable.

Safety: The user should stand behind the handle of the carrier, facing the direction of travel and place both hands on the handle, bend at the knees, and all workers lift at once.

Forearms should be roughly parallel to the ground when in the lifting and carrying position. Heavy weights are involved so caution should be used. Feet should be kept from under the log. PPE includes heavy leather boots and leather gloves.

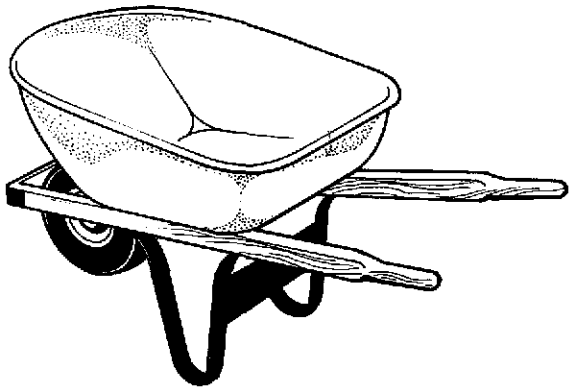
Peavy or Cant Hook



Uses: Rolling and positioning logs and timbers. This includes rolling the log to move it to another site or to rotate it in place. The main difference between these two tools is the shape of the tool's end. Peavys have a straight spike at the end whereas cant hooks have a short gripping tooth. Both are used for essentially the same purpose. Peavys are quicker to reposition when rolling a log some distance and for maintaining momentum. Cant hooks provide for more precise rotating. When arranged as opposing pairs, either tool can serve as a log carrier if a true log carrier is not available.

Safety: The user should exercise caution not to roll logs onto his/her (or someone else's) toes. Logs may roll too fast and get away. Potential for severe injury is present whenever heavy weights are being moved. PPE includes leather gloves and heavy leather boots. Hard-toe boots provide an extra measure of protection.

Wheelbarrow or Two-Wheel Cart



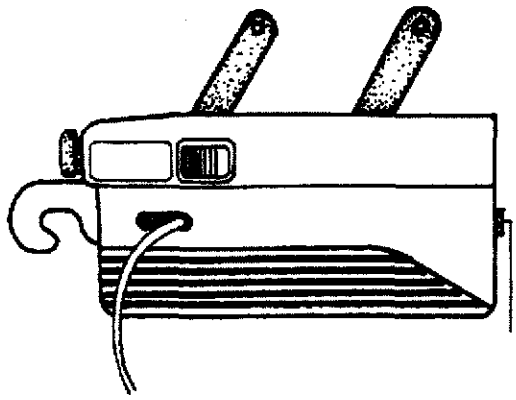
Uses: Moving loose material or supplies considerable distances.

Tips: Two-wheel carts have better balance and can often carry heavier loads— however, they require wider space to maneuver. Whether a wheelbarrow or a two-wheel cart, models should be obtained with large balloon tires. The small-wheeled garden variety is useless for trail work.

Cable Winch

Uses: To drag or swing heavy rocks or logs into place. When construction projects involve heavy stone or wood, ordinary hand tools may be insufficient.

Tips: The most common and simplest winch is the ratchet-and-pawl cable winch, usually known as a come-a-long. The inexpensive models are useless except for the lightest of jobs. The better models can move substantial loads without breaking but are limited by the length of cable that can be wound around the spool (usually about *25"*). Because of this limitation, hauling material a considerable distance requires frequent re-anchoring of the winch.



What seems to be the most popular cable winch among trail workers is a more sophisticated model known as the Griphoist® Winch. In addition to being a very strong winch, its biggest advantage is that it is a continuous cable puller. In other words, a cable of any length can be used. This allows for long pulls without having to re-anchor. These hand-powered winches use a pair of wire rope grips to pull a separate length of cable through the winch. Using the Griphoist®, a trail worker can stretch a cable all the way across a stream or ravine and pull a bridge timber into place. They also provide the basic lifting power for a "rigging" system.

Nylon slings should be used to anchor the winch to a tree and to harness rocks or logs. Chains can also be used, but in most situations the nylon sling can do the same job with less weight and less damage to the anchor tree. The winch cable should be kept freely suspended, rather than dragging it through dirt or rock, to avoid fraying and deterioration of the cable.

Safety: The user should stay out from under the load. Where the load may roll free and tumble or slide dangerously, a barrier should be built to stop it. PPE includes leather gloves, boots, and hardhats.

Rigging

Uses: Rigging refers to a system of cables, pulleys, and winches used to suspend and move heavy loads to a work site or into place. Rigging systems, powered by Griphoist® winches, can empower small crews to do great things.

Tips: The set-up and use of a rigging system requires a sophisticated level of knowledge and special training or experience. It should not be attempted without this knowledge as severe accidents,

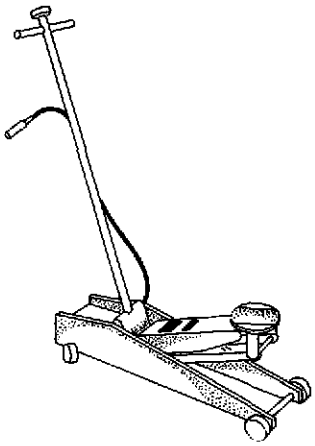
caused by the heavy loads or a breaking cable, could occur.

Rigging systems are most appropriate when there is a considerable amount of work to do at one site—such as when constructing a bridge, retaining wall, steps, or shelter. On this type of project a crew will not want to go back to the old method of brute force once they acquire the skill to effectively utilize rigging.

Safety: Similar to the safety practices shown under cable winches, but even more critical with rigging because the heavy loads are suspended and can fall on workers.

Hydraulic Jack

Uses: Raising heavy weights such as a corner of a shelter that has settled, or a bridge beam so that shims can be placed or the abutment build up. Can also be used to level heavy stone steps or any other structure—as long as room can be created to insert the jack under the object.

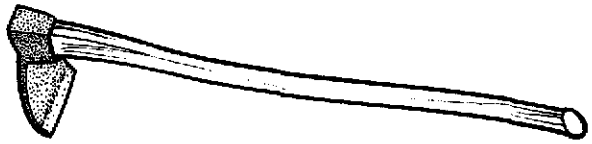


Safety: When working under heavy objects, there is always the danger of having it fall and crush whatever is under it. *Extreme caution should be used when any part of the body* is beneath the structure until it is securely in place.

Adze

Uses: An adze is essentially a form of a plane. Its use is for finishing (hewing) of beams and logs to form a flat surface—such as the walking surface of a native log bridge.

Tips: This tool should be kept very sharp and used only for hewing. It should be handled very carefully and contact with the ground avoided. It should always be protected with a sheath. A good adze is hard to find—a source is where old tools are sold.

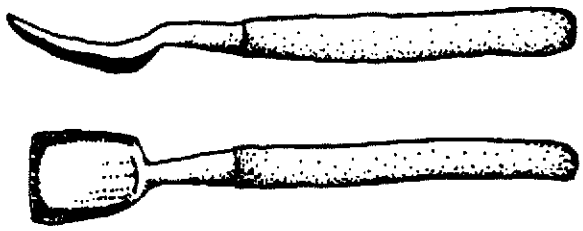


Safety: The user should exercise caution so as not to cut his/her feet or shins. When standing on the log being hewed, the toe of the front foot should be elevated so that a glancing blow can only strike the bottom of the sole of the boot. Only the back of the heel of the front foot should be resting on the log. PPE includes heavy leather boots and leather gloves.

Spud

Uses: Also called a bark spud, this tool is used to push and pry the bark from green timbers. Removing the bark slows the rotting process. Although an axe can be used to remove bark, a spud peels much faster, particularly during the spring and early summer.

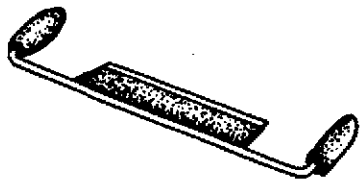
Tips: The spud has three cutting edges. All three should be sharpened on the top side only. A file should be used—a fine edge is unnecessary. Timbers peel much easier during the spring when the sap is flowing freely. Logs can be peeled in the spring and stockpiled for later use during the construction season.



Safety: The user should always push away from the body and keep hands and feet, as well as other workers, away from the front of the blade. Spuds often slip and can make serious wounds. Leather gloves are recommended.

Draw Knife

Uses: Peeling small diameter logs and poles or performing finish work on timber surfaces. Draw knives are normally used on smaller diameter material than are spuds, but on difficult to peel logs can out-perform spuds.

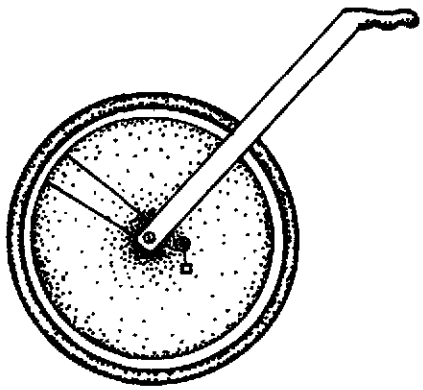


Tips: Users should acquire a true draw knife that has its handles at a right angle to the blade—rather than a bark knife that has handles in line with the blade. Bark knives are meant only for smoothing rough bark—not removing it.

Safety: Draw knives are razor sharp so caution is necessary. Leather gloves are recommended.

Measuring Wheel

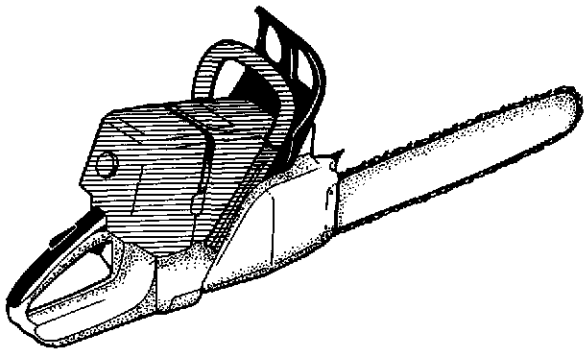
Uses: Measuring trail that is completed or under construction.



POWER TOOLS

When the situation allows, the use of power tools is appropriate along much of the Ice Age NST. In most situations, power tools can substantially increase production. They allow fewer people to construct or maintain a given amount of trail in less time. However, they have certain drawbacks which must be recognized. Power tools can increase the potential for an injury—especially in the hands of unskilled workers. Users must be particularly cautious to prevent injury to themselves or their co-workers and must wear PPE at all times. Power tools are generally heavier to carry than hand tools. They may not be worth the extra effort if long distances are being covered where only incidental work will be performed or the worksites are widely scattered.

Chainsaw



Uses: Cutting medium to large size blowdowns, clearing heavy sapling growth during trail construction, cutting trees into pieces for wood construction projects.

Tips: Saws with *16"* blades are generally adequate for most trail work. Models should be obtained with chain brakes, vibration damped handles, and high quality mufflers. The user should carry a tool kit in a pack (file, scrench, plastic wedge).

Safety: Chainsaws are one of the most dangerous pieces of power equipment. They should be used only by experienced workers (preferably those who have undergone training and are certified for chainsaw use). Required PPE includes leather gloves, ear muffs, eye protection, hardhat, and kevlar (or similar) saw chaps. Chainsaws should not be operated without the above PPE.

Brushsaw

Uses: Constructing and maintaining trail through areas of heavy brush, grass, briars, and sapling sized trees. They allow one person to rapidly clear large areas. In some situations a DR Mower® can accomplish the same tasks easier and quicker—especially in grass and smaller brush.

Tips: Brushsaws come in a variety of sizes. Trail work requires a more powerful unit than one that is used for lawn trimming. Generally, a brushsaw with an engine of 35cc to 80cc and bicycle-type handlebars is recommended. For durability, a known brand such as Stihl, Husquevarna, or Jonsered should be obtained. These saws also come with a variety of blades depending on the material to be cut. Trail work requires a saw type or a universal grass-brush blade—not a string cutter.

The brushsaw is supported by a shoulder harness, but can still become very tiring. Users should work in teams to make the job easier and switch positions regularly. When not cutting, the other person can remove brush from the trail.

A stout, flexible forked sapling (about *1"* in diameter at the base) that has been cut about *4 ½'* to *5'* in length (with about a *10"* fork at the end) is a very useful tool for flinging small limbs out and away from the trail. When following someone who is using a power brush saw, it is also an excellent tool for flinging the cut brush out of the trail. Its natural springiness allows it to be used like a pitchfork. This scatters the brush so that it is not visibly concentrated, and is more efficient than bending to pick up and discard each piece by hand.

Safety: The brushsaw's open blade is on the end of a wand, and can snag and swing

violently to the side, making it more prone to injure other workers rather than the operator. Other workers should stay clear. Required PPE is ear protection, eye protection, gloves, leather boots. Hardhats are recommended.

Lawnmower

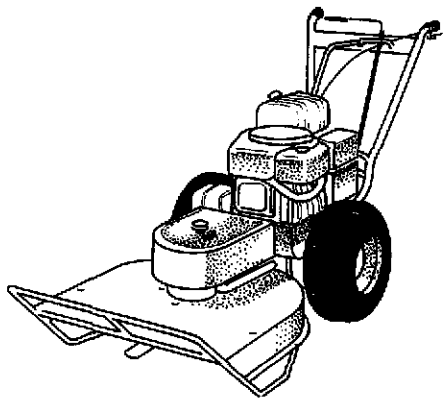
Uses: An ordinary side-discharge mower can be effectively used for clearing and maintaining trail—except in extremely rocky terrain. For grass, ferns, and weeds (up to knee high) many feel that a lawnmower is more effective than a brush saw. It is more readily available and less expensive than a DR Field Mower®, but not as durable or powerful.

Tips: A mower with a *22"* to *24"* cut and adjustable wheels seems to work well. Wheels should be set as high as possible. A mower with a universal blade for easy replacement is desirable.

Safety: Rotary mowers can throw objects, injure others, and can cause severe injury to the operator's extremities if a hand or foot gets under the mower deck. The operator should insure that other workers keep a considerable distance from the mower so that thrown objects do not cause injury. Extra caution should be used when operating on slopes, or if the vegetation is wet, to avoid slips and possible operator injury (see owners manual). Sturdy leather shoes (not jogging shoes) should be worn. Ear protection should be worn if using the mower for extended periods or the muffler is louder than 80db.

DR Field Mower

Uses: This sturdy mower is an excellent choice for cutting heavy grass, weeds, briars, and even saplings up to *1"* diameter. A DR Field Mower is simply a walk-behind brush-hog that is useful during trail construction and trail maintenance. It is more useful than a sickle-bar type mower because the material is chewed up and does not need to be removed from the trail as much as with a sickle-bar mower.



Safety: The mower can throw objects and injure others. Other workers should be kept at a safe distance away from the mower. PPE includes ear protection and leather gloves.